HEPATITIS B AND C: FREQUENCY, MODES OF TRANSMISSION AND RISK FACTORS ALONG WITH SOME UNORTHODOX ROUTES OF SPREAD

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Abstract

Background: Pakistan's being a country placed in intermediate endemicity zone of HBV and HCV, with rising population, there is lack scarcity of knowledge about transmission of risk factors specially unorthodox and frequency of this health challenge.

Methods: A retrospective case control study where case records of all patients aged from 18 - 70 years from 2012 to 2017 with either gender diagnosed as chronic hepatitis B and C were included. Information about shave from barber-shop, sharing of toothbrush at home, tattooing, cautery, and ear piercing were collected. Information about unorthodox risks for transmission of HBV and HCV, like skin branding, cupping of blood, circumcision by the barber, sharing of tooth brushes and leech therapy was collected.

Results: Among 1134 patients of chronic hepatitis B (HBV) and chronic hepatitis C (HCV), Age > 35 years, shave from barber and dental treatment were found to be risk factor for both HCV and HBV transmission. Amongst unorthodox risk factors like skin branding, cupping of blood, circumcision by the barber, sharing of tooth brushes and leech therapy, only cupping of blood (Hijama) was a significant risk for transmission of both HBV and HCV.

Conclusion: Viral related chronic hepatitis is frequently reported problem in this part of the world where HCV supersedes HBV. Socio-demographic factor like age > 35 year, shave from barbers and dental treatment were risk factors for transmission of both HCV and HBV. Among orthodox routes of transmission blood cupping (hijama) has shown as a significant transmission risk for both HCV and HBV.

Keywords: Chronic HBV, Chronic HCV, cautery

Introduction

Terminal stage liver disease related to cirrhosis and hepatocellular carcinoma is principally related to viruses like hepatitis C virus (HCV) and Hepatitis B virus (HBV). 350 million and 170 people are suffering from chronic HBV and chronic HCV respectively as estimated by World Health Organization (WHO) (1, 2). 563 000 and 366 000 deaths are annually attributed to hepatitis B and C (3). Pakistan with reference to hepatitis B and C has been placed in a zone of intermediate endemicity with the reported prevalence of 3-4% for hepatitis B whereas and 4-6% for hepatitis C (4-6).

Parenteral (blood and blood products) is a major route of transmission of hepatitis C and B along with other routes like vertical transmission (mother-to-child), sexual transmission, unsafe injections, body piercing, tattooing and hemodialysis (7). Despite of well understanding about transmission modes and intervention of protective strategies half of the HCC related deaths are still attributed to HBV infection in 2010(7). There is considerable variation among risk factors for the transmission of HCV and HBV between countries and even within the same country (8). There are some other uncommon unorthodox risks for transmission of HBV and HCV in the country, like skin branding, cupping of blood as local remedy, circumcision by the barber and sharing of tooth brushes and leech therapy. These unorthodox have not been fully explored yet.

Pakistan's being a country placed in intermediate endemicity zone of HBV and HCV, with rising population, there is an astounding scarcity of knowledge about risk factors and prevalence of this health challenge. The study is designed to determine the frequency of HBV and HCV infection, their various modes of transmission and related risk factors.

Methodology

It's a retrospective case control study conducted in medical department of Civil hospital Karachi and Dow University of Health Sciences, where case records of all patients aged from 18 - 70 years from 2012 to 2017 with either gender diagnosed as chronic hepatitis B and C were included. As the study is a retrospective case record analysis so not applied for institutional/ethics review. Demographic profile and social risk factors including shave from barber-shop, razor or sharing of toothbrush at home, tattooing, cautery, and ear piercing were all collected. Information about Injections especially about types of syringes, disposable or non disposable was also gathered. Detail past history of medical illness, previous surgery, blood transfusion, dental procedures and obstetric history of females were also retrieved. Any case with incomplete details was excluded from study. All serology including HBsAg, Anti HCV and hepatitis B core antibody total (Anti-HBc) were tested by using ELISA (3rd generation). HCV and HBV PCR were also recorded wherever done.

Test group

All patients of HCV confirmed either on serology (anti HCV +) or PCR and HBV patients confirmed on serology (HBsAg +) or PCR were considered as a test group for determination of risk factors.

Control group

Patients having negative serology of HCV (anti HCV -) but confirmed on PCR of HCV RNA along with and HBV patients with negative serology (HBsAg - and anti HBc -) but confirmed on HBV PCR were considered as controls and compared for risk factors transmission.

Statistical analysis

Mean and standard deviation (SD) were calculated for quantitative variables, whereas proportions were applied for categorical variables. Chi square and student's t test was used for parametric and non parametric data. Factors considered as risk for transmission were determined by simple logistic regression where odd ratio, 95% confidence interval was used. Independent risk factors for transmission were determined by multivariate logistic regression analysis

Results

Demographic profile:

After excluding 39 patients with incomplete information total of 1134 patients of chronic hepatitis B (HBV) and chronic hepatitis C (HCV) were retrieved over 5 years in this study. 669(58.9%) patients had HCV while 465 (41 %) had HBV. Among HCV patients 482(72%) were anti HCV + while 187 (28%) were seronegative (anti HCV -). Patients with HCV had 350 (52%) males while 319 (48%) were female. Among HCV patients, 206 (30.7%) were aged between 16-35 years) whereas majority were aged greater than 35 years, however over all mean age in both test and control group of HCV patients was (43.7± 15.7 years).

Among HBV patients 353 (75.9%) were HBsAg + while 112 (20.1%) were seronegative (HBsAg -). Patients with HBV had 283 (60.8 %) males while 182 (39.13%) were female. Among HBV patients, 164 (35.3%) were aged between 16-35 years) whereas majority 301 (64.7%) were aged greater than 35 years, however over all mean age in both test and control group of HBV patients was (45.2± 16.7 years). When compared for age between HCV and HBV patients it remains statistically insignificant. (t = 0.025, 95% CI= 1.9624, p = 0.12) All demographic details are highlighted in table no 1.

Table no: 1 Demographic profile of patients having hepatitis B and C Routes of transmission as risk factors for HCV

Demographic variables	Number N (1134)	Frequency %
Gender		
Male	691	60.9%
Female	443	39.0%
Total HCV + patients	669	59.9%
Anti HCV +	482	72.04%
HCV RNA +	187	27.95%
Total HBV + patients	465	41.0%
HBsAg	335	75.9%
Anti HBc +/HBV DNA	112	24.08%
Province wise distribution		
Sindh	689	60.7%
Punjab	94	8.2%
Baluchistan	227	20.0%
Khyber Pakhtunkhwa	124	10.9%

Various routes of transmission were identified for HCV. It includes socioeconomic and other defined risk factors. All routes of transmission were evaluated as risk factors were logistic regression analysis with making seronegative as controls where odd ratios, p value with confidence interval were determined. Age > 35 years (odd ratio 1.58, 95% CI: 1.50-2.73, P= 0.081), shave from barber (odd ratio 1.68, 95% CI: 1.56-2.43, P= 0.04) and dental treatment (odd ratio 0.63, 95% CI: 0.43-0.93, P= 0.041) were found to be risk factor as shown in table no 2.

Table no: 2 Various risk factors for transmission of hepatitis C Orthodox routes of transmission as risk factors for HCV

Risk factors	Anti HCV + (482)	Anti HCV (HCV RNA +) (187)	P value	Odd ratio CI 95%
Social & demographic factors				
Gender				
Male	230	120	0.72	1.07(0.72-1.5)
Female	252	67		
Age				
16—35 years	161	45	0.018*	1.58(1.50-2.73)
> 35 years	321	142		
Persons room occupancy				
< 3	366	145	0.66	0.91(0.59-1.39)
> 3	116	42		
Tattooing				
Yes	67	26	0.99	1.00 (0.59-1.67)
No	415	161		
Ear & nose prick				
Yes	101	30	0.18	1.38 (0.86-2.28)
No	381	157		
Shave from barbers				
Yes	351	115	0.04*	1.68 (1.56-2.43)
No	131	72		
Other risk factors				
Previous H/O hospitalization				
Yes	260	222	0.52	1.13(0.79-1.61)
No	95	92		
Blood transfusion				
Yes	266	112	0.31	.825 (0.57-1.17)
No	216	75		
Obstetrical procedures				
Yes	197	100		
No	285	87	0.21	0.79(.55-1.1)
Dental treatment				
Yes	283	129	0.014	0.63(0.43-0.93)
No	199	58		
Use of unsafe syringes				
Yes	259	89	0.93	1.27 (0.89-1.82)
No	223	98		

Various possible routes of transmission like skin branding, cupping of blood as local remedy, circumcision by the barber, sharing of tooth brushes and leech therapy were determined as possible routes of transmission for HCV patients. These possible routes were evaluated as risk factors for transmission. Cupping of blood as local remedy (odd ratio 1.63, 95% CI: 1.004-2.66, P= 0.048) was found to be statistically significant as shown in table no 3.

Table no: 03 Various possible risk factors for transmission of hepatitis C Routes of transmission as risk factors for HBV

Unorthodox risk factor	Anti HCV + 482	Anti HCV – 187	P value	Odd ratio CI 95%
Barber circumcision (98)				
Yes	67	31		
No	415	156	0.22	0.81(0.49-1.32)
Sharing of tooth brushes (76)				
Yes	20	07		
No	462	180	0.81	1.13 (0.43-2.951)
Cupping as a local remedy				
Yes	104	27		
No	378	160	0.048*	1.63(1.004-2.66)
Skin branding				
Yes	18	09		
No	464	178	0.67	0.76(0.31-1.88)
Leech therapy				
Yes	72	23		
No	410	164	0.45	1.25 (0.73-2.13)

Age > 35 years (odd ratio 0.14, 95% CI: 0.07-0.42, P = 0.000), shave from barber (odd ratio 0.54, 95% CI: 0.30-0.95, P= 0.034) and dental treatment (odd ratio 0.63, 95% CI: 0.43-0.93, P= 0.041) were shown to be a risks for HBV transmission as shown in table no 4.

Table no: 04 Various risk factors for transmission of hepatitis B Orthodox routes of transmission as risk factors for HBV

Risk factors	HBsAg + (353)	HBsAg – (112) (anti HBe + or HBV DNA +)	P value	Odd ratio CI 95%
Social & demographic factors				
Gender				
Male	190	93		
Female	135	47	0.13	0.71 (0.46-1.40)
Age				
16—35 years	153	11		
> 35 years	200	101	0.000*	0.14(0.07-0.42)
Persons room occupancy				
< 3	212	71		
> 3	141	41	0.52	0.86(0.54-1.37)
Tattooing				
Yes	41	13		
No	312	99	1.0	1.01(0.49-2.0)
Ear & nose prick				
Yes	160	57		
No	193	55	0.35	0.80 (0.51-1.25)
Shave from barbers				
Yes	253	101		
No	92	20	0.034*	0.54 (0.30-0.95)
Other risk factors				
Previous H/O hospitalization				
Yes	240	113		
No	84	28	0.16	0.70 (0.42-1.17)
Blood transfusion				
Yes	272	81		
No	98	14	0.024	0.48 (0.24-0.19)
Obstetrical procedures				
Yes	106	247		
No	40	72	0.31	0.77(48-1.24)
Dental treatment				
Yes	291	62		
No	69	43	0.00	0.63(0.43-0.93)
Use of unsafe syringes				
Yes	177	176		
No	63	49	0.24	0.78 (0.49-1.22)

Various possible routes of transmission like skin branding, cupping of blood as local remedy, circumcision by barber, sharing of tooth brushes and leech therapy were also determined as possible routes of transmission for HBV patients. These possible routes were evaluated as risk factors for transmission. Cupping of blood as local remedy (odd ratio 1.81, 95% CI: 1.03-3.22, P= 0.037) was also found to be statistically significant as shown in table no 5.

Table no: 05 Various possible risk factors for transmission of hepatitis B

Unorthodox Risk factors	HBsAg + (353)	Anti HBe – (112)	P value	Odd ratio CI 95%
Barber circumcision (98)				
Yes	52	61		
No	301	96	1.00	1.03(0.54-1.99)
Sharing of tooth brushes (76)				
Yes	22	10		
No	331	102	0.44	0.67 (0.29-1.59)
Cupping as a local remedy				
Yes	100	20		
No	253	92	0.037*	1.81(1.03-3.22)
Skin branding				
Yes	21	06		
No	332	106	0.99	1.17(0.41-3.18)
Leech therapy				
Yes	51	16		
No	302	98	1.00	1.01(0.53-1.94)

Discussion

This it's a retrospective case control study conducted in medical department of civil hospital Karachi and Dow University of Health Sciences which evaluated frequency of viral related chronic HCV and HBV patient along with risk factor for their transmission. Chronic HCV (59%) predominates in this study after chronic HBV (41%) which is in accordance to the earlier published studies (9, 10). Male gender predominates in both HBV and HCV groups of this study which is in agreement to the earlier studies (9-11). Most of the patients in this study were aged more than 35 years among chronic HBV and HCV groups. Age distribution is in contrast to an earlier local study where most of the patients were aged between 12 to 34 years (12). However the above referred study is prospective case control where cross sectional survey by random sampling was used. This epidemiologic shift with reference to age group probably suggests the improvement in risk of vertical transmission or mother to child transmission (MTCT). Chronic HCV patients in this study had (61.2%) anti HCV positivity with 38.7 % false negative (confirmed on PCR). El-Sherif A et al (13) has shown 17.9% false negativity rate of anti HCV in their patients which is less than this study. FS Eylezad (14) has also shown less frequency of false negative anti HCV as compare to our study. Among HBV patients (75.9%) were HBsAg + while 112 (20.1%) were seronegative (HBsAg -), earlier study (12) has shown the same results. Considering risk factors for transmission for HCV in this study age > 35 years was determined as a risk factor. Earlier published studies (15, 12) have shown similar results to this study where age > 35 years was determined as a risk factor for chronic HCV patients. Patients who have undergone dental treatment in this study have shown a risk for transmission of HCV. Earlier local screening studies of HCV patients have also shown dental procedures to be a risk factor for HCV transmission (16). Shaves from barber has been found another risk for transmission of chronic HCV in this study. Earlier studies (17, 18) have also shown similar results where shaves from barber were found to be predictor of HCV transmission. Among established routes of transmission considered as a risk for transmission of HBV in our study, again age > 35 years was significant. Abbass Z et al (12) in their study have shown similar results. Dental treatment in this study was also found to be a risk factor for HBV transmission which is in accordance to study conducted by Suliman M. Al Humayed (19) where extraction of tooth have shown a risk transmission of HBV. Haider J et al (16) have also shown dental procedures as a risk factor for transmission of HBV. Shaves from barber was found to be a significant risk issue for transmission of HBV in our patients. Abbasi IM et al (20) have shown similar results in their study where main reason was poor knowledge of barbers about transmission of HBV through razor.

Various common risk factor of transmission of HCV and HBV like social and demographic factors like close contact, blood transfusion, obstetrical procedures were remained statistically insignificant. Earlier study (12) has shown the same result. Tattooing and piercing (ear/nose) were tested as a risk factor for transmission of HCV and HBV in this study but remained insignificant statistically. Two large Meta analyses (21, 22) concluded tattooing as a major risk for spread of HCV and HBV in prisoners and non prisoners respectively which is in

disagreement with our study. Some of the possible routes of transmission among HBV and HCV, like group circumcision from barber, sharing of tooth brushes; skin branding and cupping (hajjama) were also evaluated as risk factors in this study. Among these possible routes like group circumcision from barber, sharing of tooth brushes; skin branding were not found to be statistically significant in this study which is in accordance to the earlier local study. Blood cupping (Hijama) was shown to be a significant risk for HBV and HCV transmission in this study.

Hijama is a frequently practiced is a type of alternative medicine where a cup is used to draw blood from lacerated skin into traction. Hajjama like techniques of cupping and bloodletting are were also used in traditional Chinese medicine. Earlier over review of systemic review by Lee MS et al (23) has concluded poor quality of evidence for Hijama as an alternative treatment except for pain. Later study (24) concluded poor quality of evidence for Hijama even as treatment remedy for pain. Only cupping (hajjama) was turned out to be significant issue for transmission of HCV and HBV in this study which is in accordance to earlier studies (22, 25). Leech therapy is also very common in rural parts of various provinces of Pakistan (26, 27). *Hirudo medicinalis* (medical leech) has been used since ancient time for various medical ailments; however in this part of the world they are being applied on body to relive different inflammatory states like swollen limbs. Earlier studies have shown leech therapy as transmission source of HBV. This study did not prove leech therapy as a possible route of transmission for either HBV or HCV.

This study has few limitations one is of its design as retrospective if kept prospective, would have been more impeccable. The study is based on information's retrieved from hospital setting which shows its limitation as there is chance of information bias on the basis of missing record. Secondly this study is single centered which could have been better if it was multicentered.

Conclusion

Viral related chronic hepatitis is frequently reported problem in this part of the world where HCV supersedes HBV. Socio-demographic factor like age > 35 year, shave from barbers and dental treatment were found to be risk factors for transmission of both HCV and HBV. Among orthodox routes of transmission blood cupping (hajjama) has shown as a significant transmission risk for both HCV and HBV.

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